



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/030,232	04/26/2002	Hye-Jeong Kim	678-777 (P9485)	9211
28249	7590	10/18/2006	EXAMINER	
DILWORTH & BARRESE, LLP 333 EARLE OVINGTON BLVD. UNIONDALE, NY 11553			CHOU, ALBERT T	
			ART UNIT	PAPER NUMBER
			2616	

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/030,232	<b>Applicant(s)</b> KIM, HYE-JEONG	
	<b>Examiner</b> Albert T. Chou	<b>Art Unit</b> 2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on September 29, 2006 for the amendment.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2 and 4-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4 is/are allowed.
- 6) ☒ Claim(s) 2, 5 and 6 is/are rejected.
- 7) ☒ Claim(s) 7 and 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The following is a response to the amendment filed on September 29, 2006:
  - Claims 2 and 4-8 are pending in the application.
  - The declaration filed on September 29, 2006 under 37 CFR 1.131 is sufficient to overcome Shirakata et al. and Kumagai et al. references.
  - Claims 1 and 3 are canceled.
  - Claims 2, 5 and 6 remain rejected.
  - Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,953,311 to Davies et al., in view of US Patent No. 6,510,133 to Uesugi and further in view of US Patent No. 5,694,389 to Seki et al.
  - Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,058,101 to Huang et al. (hereinafter "Huang"), in view of US Patent No. 6,570,943 to Goldston et al.
  - Claim 4 remains to be allowed
  - Claims 7 and 8 remain objected.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,953,311 to Davies et al. (hereinafter "Davies"), in view of US Patent No. 6,510,133 to Uesugi and further in view of US Patent No. 5,694,389 to Seki et al (hereinafter "Seki").

Regarding claim 2, Davies teaches an apparatus for compensating for a frequency offset using a pilot symbol for a transmitter in an OFDM system including a receiver for performing the fine frequency synchronization using a pilot symbol, comprising:

a pilot symbol inserter for receiving a spread data symbol stream and inserting a pilot symbol at intervals of predetermined data symbols **[Fig. 4; Pilot Carrier Inserter ; Pilot carriers are inserted via a Signal Mapper 22; col. 2, lines 55-58];**

a serial-to-parallel (S/P) converter for receiving the pilot symbol-inserted data symbol stream, and outputting N data samples of a symbol unit in parallel **[Fig. 4, Serial-parallel Converter 18];**

an inverse fast Fourier transform (IFFT) section for performing an IFFT operation on the N data samples **[Fig. 4, IFFT];** and

a guard interval inserter for inserting the guard interval between the OFDM symbols **[Fig. 4, Guard Interval Inserter 26].**

However, Davies does not expressly disclose a parallel-serial (P/S) converter for serializing the IFFT-transformed N data samples and outputting an OFDM symbol, and the guard interval inserter copying a part of the data samples of the OFDM symbol and inserting the copied data sample in the front of the OFDM symbol.

Uesugi teaches a parallel-serial (P/S) converter for serializing the IFFT-transformed N data samples and outputting an OFDM symbol **[Fig. 4; IFFT 5 and Parallel-Serial Converter 6]**;

Seki teaches a guard interval inserter in an OFDM transmitting apparatus. The guard interval inserter copies a part of the data samples of the OFDM symbol and inserts the copied data sample in the front of the OFDM symbol **[Fig. 4; Guard Interval Inserting Circuit 209 copies the rear portion of a single OFDM symbol to the front of the symbol as a guard interval; col. 5, lines 66-67, col. 6, line 1]**.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include a serial-parallel converter before a guard interval inserter as disclosed by Uesugi and a guard inserter which copies a part of the data samples of the OFDM symbol and inserts the copied data sample in the front of the OFDM symbol as disclosed in Seki into Davies' invention.

The motivation would have been to reduce the influence of the inter-symbol and multi-path interference in the OFDM system.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,058,101 to Huang et al. (hereinafter "Huang"), in view of US Patent No. 6,570,943 to Goldston et al. (hereinafter "Goldston").

Regarding claim 5, Huang teaches an apparatus of compensating for a frequency offset using a pilot symbol for a receiver in an OFDM system comprising:

a first carrier synchronizer for receiving an OFDM symbol stream and performing approximate frequency synchronization using the guard interval **[Figs. 3 & 6; Fractional Frequency Offset Estimation 40; col. 8, lines 40-55, col. 9, lines 14-26];**

a fast Fourier transform (FFT) section for performing an FFT operation and outputting the data symbol **[Figs. 3 & 6, FFT 82];**

a second carrier synchronizer for compensating for a fine frequency offset using the pilot symbol inserted in the data symbol stream **[Fig. 3, Integral Frequency Offset And Sync Decision & Position Compare 92; col. 9, lines 44-67, col. 10, lines 1-12].**

Huang does not expressly disclose a guard interval remover for removing the guard intervals from OFDM symbol streams after performing frequency synchronization.

Goldston discloses a guard interval remover for removing the guard intervals from OFDM symbol streams **[Fig. 3, Guard Interval Removal Circuit 151 & FFT 153; col. 5, lines 58-66].**

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include a guard interval remove as disclosed by Goldston, by removing

the guard interval from OFDM symbol streams after performing frequency synchronization in Huang's OFDM receiver as both teachings are related to an OFDM receiving apparatus.

The motivation would have been to allow the OFDM receiver to perform a first frequency synchronization using the guard intervals which are inserted at the OFDM transmitter and to ensure the transmitting signal is correctly restored at the OFDM receiver.

Regarding claim 6, Huang teaches a first synchronization system **[Figs. 3 and 6]**, which comprises:

a guard detector for detecting a guard interval from the OFDM symbol stream **[Fig. 3; envelop detector 10; col. 5, lines 36-40];**

a copied sample detector for detecting data samples copied from the detected guard interval, from the OFDM symbol stream **[Fig. 6, Delay Circuit 72, First Arithmetic Circuit 74 & Multiplication Circuit 76; col. 8, lines 46-48];**

a phase difference detector for calculating a phase of the data samples of the detected guard interval and a phase of the copied data samples, and calculating a phase difference between the two data samples **[Figs. 3 & 6; Second Arithmetic Circuit 77, Fractional Frequency Offset Estimation 40];**

an averager for calculating a frequency error by averaging the phase differences output from the phase difference detector in the frame unit, and outputting a first

Art Unit: 2616

frequency offset compensation signal according the frequency offset [**Figs. 3 & 6; Average Filter 50**]; and

a first frequency offset compensator for compensating for a frequency offset of the OFDM symbol according to the first frequency offset compensation [**Fig. 6; Exponential Circuit 78 & Multiplication Circuit 75; col. 9, lines 32-33**].

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 2, 5 and 6 have been considered but are moot in view of the new ground(s) of rejection.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Albert T. Chou whose telephone number is 571-272-6045. The examiner can normally be reached on 8:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571-272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



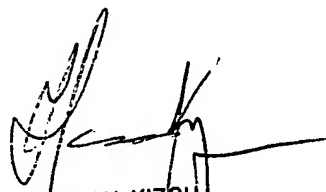
Art Unit: 2616

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Albert T. Chou

October 11, 2006

AC

  
HASSAN KIZOU  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600